# Dispenser for Toilet Cleaner Solids or Liquids

*Field of invention*

The field of the invention is dispensers of cleaning agents especially cleaning agents dispensed into flush water for water closets or toilets. More particularly the present invention is concerned with dispensers that use siphon (syphon) action. The siphon action of the present invention can dispense toilet fresheners from either solids or liquids

*Background of Invention*

The need for disinfecting devices for toilet flush water was recognized over 100 years ago. See US 685,885. At the beginning of the twenty first century, most American homes have at least one flush toilet. This huge market has propelled development of devices that dispense cleaning or disinfecting compounds in the flush water of toilets. There have been two basic approaches to this problem of releasing small but effective amounts of cleaner/disinfectants from either tablets or liquid dispensers.

A first means of releasing cleaner-disinfectant in the flush water is to have a device that releases a measured volume of liquid with each flush. There are a numerous devices in the patent literature that do just that. A recent example is US 6,412,120. These dispensers must be simple and inexpensive to manufacture.

A second means of treating flush water is to use solid tablets of disinfectants. This solid mass of disinfectant is formulated so that with each toilet flush a measured amount of

solid is released. The above cited 685,885 used this principle. There are a large number of such solid tablets described in the patent literature and available in commerce. Solids are released in the flush water in two basic ways. A) The tablet is placed in the water tank and the solid will dissolve in a slow prescribed manner. B) The second is a device that allows a certain amount of flush water to flow in a prescribed manner over the solid so that with each flush the device containing the solid will respond and release a certain amount of the dissolved solid tablet with each flush.

Because this problem of treatment agents in toilet water needs to be addressed in a simple yet effective manner there is a relatively large art for such dispensers. It is the intent of this invention to provide an inexpensive to manufacture device that will release a consistent amount of disinfectant either from a solid bolus or from a fluid container into the flush water with each flush of the toilet.

A solid bolus of toilet water conditioner can be one of a number of solid tablets of chemicals useful in small amounts to condition the toilet water with cleaners or fresheners as well as pH adjustments. Of interest is US 4,745,638. A significant improvement of the present invention compared to the prior art is that the present invention has a siphon with an enlarged outlet funnel; which outlet funnel has a restricted exit hole. This siphon is connected to the bottom of a dispensing volume.

*Summery of Invention*

The invention is a dispenser for either solid or fluid cleaning or conditioning agent for toilet water. The source of conditioning fluid may be a liquid or a solid which solid has water from the flush tank flow over it. An aliquot of conditioning fluid is stored in a dispensing volume, which is connected to an air passage. Connected to the bottom of the dispensing volume is a siphon with an enlarged outlet funnel. The enlarged outlet funnel has a restricted exit hole. The conditioning fluid may be placed as a liquid form in a reservoir. That reservoir is connected via a pinhole to a dispensing volume which dispensing volume is a means of aliquoting the conditioning fluid. Connected to the bottom of said dispensing volume, in turn, is a siphon with an enlarged outlet funnel which enlarged outlet funnel has a restricted exit hole The means of aliquoting the conditioning fluid in a liquid form may be a dispensing volume of flush water sucked from an open cup which water passes over a bolus of cleaning agents. Two more specific embodiments of the above generic invention is as follows:

A first more specific embodiment is a dispenser for a toilet cleaning fluid into flush water volume of a flush toilet with a reservoir for the cleaning/conditioning fluid. A pin hole connects that reservoir to a dispensing volume. An air passage connects the dispensing volume to the ambient air. A siphon connects from the bottom of the dispensing volume to toilet bowl water. The siphon is an enlarged outlet funnel. The enlarged outlet funnel has a restricted exit hole.

Either a rigid reservoir or a flexible reservoir may be used to store the prepared cleaning fluid. A flexible reservoir which collapses as fluid is dispensed may be used. An air passage may provide a direct vent into rigid reservoir as the cleaning fluid is removed.

A second embodiment of the invention is an enclosed reservoir to dispense disinfectant/cleaner from a solid bolus of disinfectant/cleaner into toilet water. The bottom of the enclosed reservoir is a catchment volume which connects to a siphon. That siphon may have an enlarged outlet funnel exit. Enclosed in said reservoir is a temporary catch trough with a leak hole. The leak hole drips water over the solid bolus of toilet water conditioner into the catchment volume. The temporary catch trough receives flush water a from U-shaped toilet sub-siphon. One end of that U-shaped sub-siphon is open to the ambient air. The other end lends to the temporary catch trough. The U-shaped toilet sub-siphon has a water entrance hole to allow flush water into the sup-siphon. In an alternative version flush water from an open cup is pulled through a tube from the cup to the catchment volume.

The solid bolus of toilet water conditioner may be permanently sealed within said enclosed reservoir or an operable opening may allow the solid bolus to be replaced. Baffles or an enlarged central portion of the siphon may be used to slow down the release of water from the siphon.

One of the advantages of the present invention is that is can be manufactured in any of

various configurations. This is important because the current Federal requirements limit the volume of flush water. As long as the principles is followed as in Figure 1, any number of configurations may be manufactured. For example, the dispenser may be fitted into one corner. The reservoir may be in a second corner and the reservoir and dispenser may be connected by one or more tubes following the disclosed principles.

*Brief description of figures*

Figure 1 shows one generic or abstract version of the present invention. From this generic description, various specific embodiments follow. Figure 1 shows the present invention as generic dispensing device in a generic water tank, which water tank can rapidly release its water, (or other fluid).

Figure 2 shows a side view of the dispensing device to dispense a measured amount of liquid with each flush of the toilet. Figure 3 shows a top view of that device. Figure 4 and Figure 5 show an alternative embodiment that is easily manufactured.

Figure 6 shows a side view of the dispenser with a bolus in place. Figure 7 shows the cut A-A through Figure 6. Figure 8 shows a top view of the dispenser. Figure 9 shows a side view of Figure 6. Figure 9 shows an edge view of the dispenser with the enlarged siphon funnel end.

Figures 10, 11, 12, and 13 show embodiments of the enlarged outlet funnel with baffles to slow the exit of the water from the siphon.

Figures 14 and 15 show the enlarged outlet funnel to be central in the siphon to provide a delayed release of water from the enlarged outlet funnel..

Figure 16 shows a side view of about an alternative dispenser 1710.

Figure 17 show a top view of dispenser 1710.

Figure 18 shows a side view of dispenser 1710.

*Detailed Description of Figures*

The Figure 1 shows cleaning agent dispenser 110. The cleaning agent dispenser has a cleaning agent reservoir 111. Cap 120 provides an opening to replace the disinfecting cleaning agent 126. Fluid reservoir 111 communicates with dispensing volume 112 via pin hole 113. Air passage 115 allows air into dispensing volume 112 so than when siphon 116 is activated by the toilet flush, the cleaning-disinfecting fluid is transported via siphon 116 into flush water 124. The transport of the disinfecting fluid via the siphon 115 is much greater then the movement of the fluid via pin hole 113 from reservoir 111 to dispensing volume 112. Siphon (syphon) 116 has an enlarged outlet funnel 123.

Air needs to replace the dispensed fluid 126 as it is released from reservoir 111. There are three basic ways of allowing air into reservoir 111. First, there can be a direct vent 133 into reservoir 111. Second, there can be a branch line 134 from an enlarged space151 in air passage 115 to reservoir 111. A third way to allow dispensing of disinfectant is to store the disinfectant in a flexible reservoir which reservoir collapses as fluid is dispensed from that flexible reservoir.

Figure 2 shows an embodiment of the invention fluid dispenser 210. The fluid dispenser

includes a fluid reservoir 211. Fluid reservoir 211 is covered with a lid 220. Lid 220 has a cap 221 to provide an opening to replace the disinfecting fluid 126. Fluid reservoir 211 communicates with dispensing volume 212 via pin hole 213. Dispensing volume 212 may have an enlarged base 214 to determine the amount of disinfecting fluid released. Air passage 215 allows air into dispensing volume 212 so than when siphon 216 is activated by the toilet flush, the cleaning-disinfecting fluid is transported via siphon 216 into flush water. The transport of the disinfecting fluid via the siphon 216 is much greater than the movement of the fluid via pin hole 213 from reservoir 211 to dispensing volume 212. Siphon (syphon) 216 has an enlarged outlet funnel 223. Hangers 225 allow the placement of the dispenser 220 on the rim of the water tank of the toilet.

Figure 3 shows top view of the invention fluid dispenser 210. The fluid dispenser includes a fluid reservoir 211. Fluid reservoir 211 is covered with a lid 220. Lid 220 has an opening 316 to allow air to replace the disinfecting fluid 126. Dispensing volume 212 may have an enlarged base 214 to determine the amount of disinfecting fluid released. Air passage 215 allows air into dispensing volume 212 so than when siphon 216 is activated by the toilet flush, the cleaning-disinfecting fluid is transported via siphon 216 into flush water. The transport of the disinfecting fluid via the siphon 216 is much greater than the movement of the fluid via pin hole 213 from reservoir 211 to dispensing volume 212. Siphon (syphon) 216 has an enlarged outlet funnel 223. Hangers 225 allow the placement of the dispenser 220 on the rim of the water tank of the toilet.

However, other configurations of the invention may be cheaper to manufacture. Examples of this are shown in Figure 4 and Figure 5 . Figure 4 shows the disinfectant reservoir 411 in the form of a bottle. The bottle 411 is attached to the dispensing device 410 by means of threads 433. Other means of attachment or the bottle reservoir 411 to the dispenser 410 are common to the art. Shown also is enlarged outlet funnel 423 and catch volume container 217. Cut A-A to show the inner working of the dispenser is shown as Figure 5.

Figure 5 show the cut A-A in Figure 4. Place 434 shows the area of attachment thread connection for bottle 411. Place 434 allows the movement of the dispensing fluid from reservoir 411 to pinhole 413. An air vent opening 450 allowed outside air into an enlarged space 451. Enlarged space 451 for outside air leads to 452 which should turn leads to the reservoir volume 411. This allows outside air into the reservoir 411 as the fluid is dispensed. Likewise, enlarged space 451 leads to 415 which allows air into the dispensary volume 412. Siphon 416 leads from dispensing volume 412 to the outside.

Figure 6 shows a side view of dispenser for solid disinfectants 610. Conditioner bolus 630 (work piece) shown in outline. A solid bolus can be used with an aliquot of flush water to produce conditioning fluid for flush toilets. Bolus 630 is a reserved in enclosed rectangular reservoir area 626. At the bottom of said enclosed rectangular reservoir 626 is a catchment volume 613. This catchment volume 613 may be connected to enclosed rectangular reservoir 626 by smaller holes. Catchment volume 613 connects to siphon

616. Enlarged outlet funnel 623 is at the exit end of siphon 616. Enlarged outlet funnel 623 surrounds siphon exit space 618. In the upper area of rectangular reservoir 626 is temporary catch trough 628 shown in outline. Temporary catch trough 628 leak hole 629 allows water to drip over bolus 630.

Figure 7 shows the cut A-A through Figure 6. Catchment volume 613 and bolus 630 are shown internal to rectangular reservoir area 626. Temporary catch trough 628 is shown in profile. To allow the efficient operation of the dispenser, there is ample openings between temporary catch trough 628 and the reservoir area 626 to allow air to move from sub siphon 928 to the enclosed reservoir.

Figure 8 shows a top view of dispenser 610. Temporary catch trough 628 is shown in with catch hole leak hole 629. Upper turn 818 of siphon 616 is shown. A second upper turn 929 of sub siphon 928 is shown leading from sub siphon 929 into temporary catch trough 628.

Figure 9 shows the edge view of the dispenser 626. Siphon 616 with enlarged outlet funnel 623 is shown. Toilet sub siphon 928 fills to the level of the flush water 950 by seepage through toilet water entrance hole 925. Toilet sub siphon 928 has an opening to the ambient air 670. The U-shaped toilet sub-siphon 928 drains into temporary catch trough 628 via upper turn 929.

Figure 10 shows the enlarged outlet funnel 623 of siphon 616. Internal are one or more baffles 918 with a holes 919 in baffles 918. Baffles 918 slows the exit of water from the siphon outlet funnel to aid the withdrawal of the cleaner/disinfectant. Experimental evidence indicated that if the siphon is slowed the cleaner/disinfectant is more uniformly dispensed. Figure 11 (cut C-C) shows the baffle 918 with hole 919 in the general center area. Figure 12 show an alternate baffle system in enlarged outlet funnel 623. Instead of a hole 919 in the center, Figure 12 that one or more baffles 920 each have an opening 921 at the edge of the baffle instead of the center. Figure 13 shows the cut D-D to show the opening 921 at the edge of baffle 920.

Figures 14 and 15 show an alternative enlarged siphon exit. Siphon 616 enlarges into a bulge165. Bulge 165 in turn narrows to exit hole 167. This narrowing of bulge 165 decrease the exit rate of siphon 616. Figure 16 shows the top view of embodiment of figure 16. Siphon 616 is shown with bulge 165 and the profile of exit piece 160.

Figure 16 shows a side view of about an alternative dispenser 1710, with toilet water conditioner bolus 630 (work piece) shown in outline. Bolus 630 is a reserved in enclosed rectangular reservoir area 626. At the bottom of said enclosed rectangular reservoir 626 is a catchment volume 613. This catchment volume 613 may be connected to enclosed rectangular reservoir 626 by smaller holes. Catchment volume 613 connects to siphon 616. Enlarged outlet funnel 623 is at the exit end of siphon 616. Enlarged outlet funnel 623 surrounds siphon exit space 618. In the upper area of rectangular reservoir 626 is

temporary catch trough 628 shown in outline. Temporary catch trough 628 leak hole 629 allows water to drip over bolus 630.

Figure 7 shows the cut A-A through Figure 1710. Catchment volume 613 and bolus 630 are shown internal to rectangular reservoir area 626. Temporary catch trough 628 is shown in outline profile. To allow the efficient operation of the dispenser, there is ample openings between temporary catch trough 628 and the reservoir area 626 to allow air to move from sub siphon 928 to the enclosed reservoir.

Figure 17 shows a top view of dispenser 1710. Temporary catch trough 628 is shown in outline with catch hole leak hole 629. First upper turn 818 of siphon 616 is shown. A second upper turn 929 continues from connector tube 1913. Connector tube 1913 connects aliquot volume 1711.

Figure 18 shows the edge view of the dispenser 1710. Siphon 616 with enlarged outlet funnel 623 is shown. Aliquot volume 1714 fills with flush water 950 through open cup 1711. The flush water 950 from aliquot volume 1714 is drawn through opening 1711. Open cup 1714 connects with connector tube 1913 to The U-shaped toilet sub-siphon 929. Sub-siphon 929 drains into temporary catch trough 628 via upper turn.

*Operation of the liquid and solid dispensers*

The fluid dispenser 210 operates in the following manner: Dispenser 110 is retained in

place by attaching via hanger(s) 125. Fluid reservoir 111 is filled with cleaning fluid 126 through cap 221. This filling can take place either before dispenser 111 is affixed to the rim of the toilet water tank or it can be filled when fluid dispenser 111 is in place. The flush water level 124 is shown prior to the flushing of the toilet. Because of the principle "Water (liquid) seeks its own level." the cleaning-disinfecting fluid 126 will flow from the fluid reservoir 211 via pin hole 213 to fill dispensing volume 112. Enlarged base 214 provides a more constant dispensed volume of fluid as the level of disinfecting cleaning agent 126 is lowered as it is removed from cleaning agent reservoir 111.

As the toilet is flushed the water in the toilet tank drops rapidly. Thus the water in the siphon 216 and enlarged outlet funnel 223 drops as the toilet is flushed. This creates a partial vacuum in siphon 216. The disinfecting fluid 126 in dispensing volume 212 is drawn into the partial vacuum in siphon 216. Since the volume of enlarged outlet space 223 is greater than the dispensing volume 212, as the water drops it sucks disinfecting fluid 126 into the siphon 216 and thus into the flush water.

After the toilet stopper closes and the water tank is refilled, the air trapped in enlarged base 214 and siphon 216 is forced through siphon 216 and thus removing disinfecting fluid 126 which may act to restart the siphon. After the dispensing volume 212 is sucked out after the flush, pinhole 213 allows the refilling of dispensing volume 212 to restart the cycle.

Concerning dispensers with solid cleaners: flush water 950 drops as a toilet flushes, it creates a partial vacuum in the siphon 616. This in turn draws out the dissolved material that is in catchment volume 613. This flush create a partial vacuum in the rectangular reservoir area 626. To relieve this partial vacuum ambient air enters opening 670. Note toilet water entrance hole 925 has filled toilet sub siphon 928 to the level of flush water 950. Aliquot volume 1711 fills with flush water 950 as in embodiment 1710. Since sub siphon 928 has been filled with water, the partial vacuum pulls the water from sub siphon 928 to catchment volume 628. The water in catchment volume 628 is temporarily stored prior through leaking through leak hole 629 which water drips over bolus 630. The water that has dripped over bolus 630 dissolves parts of bolus 630 and collects in catchment volume 613. At this stage, the dispenser awaits the next flush and will dispense cleaner detergent into the next volume of flush water. The enclosed reservoir may be designed so that the bolus of cleaner is permanently sealed within the reservoir, or may be designed so that the bolus of cleaner may be replaced.